

TILLER-MOUNTED LADDER OPERATIONS

One of the most satisfying and rewarding positions in the fire service is apparatus driver/operator/chauffeur. The apparatus operator often is the quarterback of his fire company. The driver's ability to position and handle the firefighting functions of the apparatus can affect the outcome of fireground operations. This article focuses on apparatus placement and aerial ladder operations—specifically the tractor-trailer with a four-section 100-foot aerial ladder.

The apparatus operator assigned to a truck company in a major urban area can encounter many obstacles that may affect the placement of the apparatus and deployment of the aerial ladder. In an old city such as San Francisco, some of these obstacles are congested, hilly, and narrow streets. Many of these streets are also lined with trees and cluttered with overhead power lines.

STRUCTURE FIRE

Although the fire department has diversified its service and responds to many types of calls, the most challenging alarm is still the reported structure fire. The viewpoints of the driver of the ladder company presented here are based on the initial alarm assignment that includes two truck companies.

THE DAILY CHECK

Successful deployment of the aerial ladder in the field starts with the daily maintenance check of the equipment at the beginning of each shift.

Every day, the operator/driver should take the aerial ladder truck out of the fire station and raise the aerial. The inspection should include looking for frayed cables and hoses, defective floodlights (if any are mounted), intercom operability, and structural damage. The cable, pulley, and reel movement should be checked to ensure free movement and that no damage will occur when the aerial is extended or retracted. Anything about the aerial ladder found to be unusual, no matter how minor, should be reported through the proper channels.

Raising the ladder daily familiarizes the operator with the sounds, feel, movement, and look of the aerial ladder and gives new operators an opportunity to practice, learn, and understand the ladder's capabilities.

The key to becoming an effective aerial operator is practice. The operator should take the opportunity to play with the console on the turntable and learn how to handle the controls with a deliberate motion that will provide a smooth application of power. This will reduce the jerky movement in the aerial that can lead to the whipping effect at the ladder tip. In addition, the operator should work toward developing a technique for accurately raising, rotating, and extending the aerial toward the target.

THINGS TO THINK ABOUT WHILE RESPONDING

Driving an apparatus with lights and sirens can be stressful. The driver must be concerned with finding the quickest route to the scene while considering factors such as traffic laws, street conditions, traffic congestion, and pedestrian traffic.

Also, while en route to a reported structure fire necessitating a full assignment, the apparatus operator must consider factors that may affect placement of the apparatus and deployment of the aerial ladder, such as the general response patterns of nearby companies.

In a big city, a full assignment may consist of three engines, two ladders, one rescue, three chiefs, and one medic unit. For safety reasons, the driver should know from where all the companies are responding. In addition, particular attention should be given to the location/direction from which the other truck company is responding. This information can affect apparatus placement and use of the aerial. With two truck companies responding, the best tactic is to have both companies approach the fire building from opposite directions. This strategy will enable the frontage of the fire building to be laddered from the left and the right sides if needed. In addition, multiple ways of egress can be established for crews working inside the building and on the roof. If the building is on the corner, the first-due truck may ladder one side and the second-due truck the other exposed side.

The truck company operator must also be aware of the first-arriving engine company. If at all possible, the first-due engine should approach the alarm location first. By allowing the first-due engine to proceed down the street first, the engine operator can position the engine just past the fire building, which will enable the engine crew to efficiently lay hoselines. An experienced engine driver will consider leaving plenty of room for the incoming truck so the aerial can be used most effectively. Having the truck arrive as the second apparatus also allows the truck crew to safely remove ground ladders from the truck's ladder bed.

Often on a full assignment, no fire is showing when companies arrive. Thus, another factor that should be considered while responding is the address of the fire. Knowing if the address is an odd or even number can help the driver to determine on which side of the street the fire building is located. Also, the driver can use the last two digits of the address to help determine the location of the building on the block—for example, extremely low digits such as 00 or 03 or extremely high digits such as 95 or 98 might indicate a corner building, whereas the last two digits such as 45, 50, and 53 might indicate that the building is in the middle of the block.



APPROACHING THE INCIDENT

(1) Teamwork between the drivers of the engine and truck made it possible for the engine to park in front of the fire building and the truck to use its aerial. [Photo by Michael Mustacchi, San Francisco (CA) Fire Department; all other photos by author.]

The most important thing the driver of a ladder truck can do is SLOW DOWN and approach the fire block in a controlled manner. This will allow the operator, officer, and crew to size up the situation. Factors on the street that can affect the placement of the aerial include overhead obstructions, fire apparatus already on the scene, narrow streets, and parked cars (photo 1).



(2) The view from the tiller box. Since the tiller can see the entire aerial ladder in front of him, he can determine if the aerial can clear any overhead obstructions.

Good communications and an excellent working relationship between the driver and tiller will pay big dividends in effectively positioning the apparatus. The driver, tiller operator, officer, and crew can use their headsets to maintain communication on the rigs. As the driver brings the apparatus into the fire block, the tiller operator sitting in the tiller box has the best view. In many cases, the tiller operator can determine if the aerial ladder can clear any overhead obstructions (photo 2).

Overhead Wires

In many old neighborhoods, overhead wires and power lines are still a common sight. As intimidating as these wires may look for the apparatus operator, there is always the chance that the aerial can still be deployed. As the driver notices the many wires on the approach to the fire block, he should observe the side on which the power poles are located. In San Francisco, most of the older streets that still have overhead wires have the power poles on one side of the street. On that side, many high-voltage wires are attached to the poles and run parallel along the front of the houses. These parallel wires will prevent the aerial's deployment to the houses on that side of the street. However, the houses across the street are another story. Since no power poles are on that side of the street, wires will be strung across the street from the existing power poles. Thus, the wires are attached to the houses at different angles. From the viewpoint of the apparatus driver, these buildings may be laddered; the aerial may be deployed between the wires (photo 3).



(3) A typical street in an older city. There are many overhead wires. The houses on the left have the power poles with lines running along the front of the buildings. Deploying the aerial ladder on this side is almost impossible.

Also, these overhead wires will force the operator to rotate the aerial underneath the wires to get the ladder in position before it can be raised and extended. Since the ladder must be rotated at a low-angle inclination to get below the wires, the ideal distance between the apparatus and the building should be approximately 25 to 30 feet. This should allow a fully retracted ladder to be freely rotated and clear the structure (photo 4). Once the aerial is rotated under the wires to a position where the wires are no longer a factor, the ladder can be raised and extended.

In cities such as San Francisco and Seattle, transit wires can also affect the placement of the aerial apparatus. When the building to be laddered is three or fewer stories, the apparatus must be placed close to the sidewalk so the aerial can be tucked under the wires. If the streets have wide lanes and the building is four to six stories high, the apparatus may be placed farther away from the building. This will enable the aerial to be safely raised over the transit wires to reach the building's upper floors or roof. However, raising the aerial ladder over the transit wires will restrict the aerial from being lowered to the second or third floors if that should be needed for a rescue.

POSITION OF OTHER APPARATUS ON-SCENE

As the ladder truck slowly approaches the incident, the driver should observe placement of the engine or the other truck. If the front of the engine is facing the driver, the driver must be careful not to block that engine. That engine might lead out and hook up to the corner hydrant.



(4) Ideally, the apparatus should be 25 to 30 feet from the building. This distance enables the operator to rotate the ladder at a low angle of inclination, thereby avoiding contact with overhead obstructions.

The driver of the second truck arriving at the scene must pay attention to the placement of the first-arriving truck. If the driver of the second truck sees the back end of the first truck facing him as he approaches the scene, he should consider driving the truck around the block and coming in from the opposite direction, keeping in mind the benefits of two truck companies' approaching from opposite directions. If this maneuver is used, the driver should slow down and size up the situation while approaching from the opposite direction. Again, the driver must pay attention to the position of the engine and make sure that driver has enough room to lead out if necessary.

However, the operator should never force the situation. The block may be small and the street narrow. The first-due truck may already be on the scene and properly positioned, the fire building might be down an extremely narrow street or alley, or illegally parked cars might prevent the truck from entering. In these

situations, the driver of the truck should park the rig so that it will not block any intersections or hydrants or hinder incoming units. The aerial will be useless, but ground ladders can still be deployed.

If the aerial truck can proceed down the narrow street or alley, the driver should still consider that extra space is needed to extend the outriggers. If the department is fortunate to send fully staffed ladder companies, the driver should allow the firefighters to get off the rig and assist in the placement of the apparatus so that the outriggers and aerial can be deployed.

Alignment of Aerial

Once the apparatus is positioned in front of the fire building, the aerial ladder must be properly aligned with the target. The key is to get the aerial ladder positioned so that when the aerial is deployed it will be perpendicular to the building. Having the aerial perpendicular to the target enables the extended aerial to rest on both beams when it reaches the target. This is especially true if the aerial must be placed to a specific object such as an upper-floor window, a fire escape, or a balcony. To facilitate the alignment, the operator should create an imaginary line from the target (i.e., upper-floor window), eyeball it vertically down to the street, and line up the dual axle of the tractor-trailer aerial with the imaginary line. The aerial ladder will be properly positioned for deployment. The dual axle is used because the turntable is situated directly above and in line with the axle.

TACTICS MAY DETERMINE PLACEMENT

The incident commander, based on tactics and strategy, may dictate where the ladder truck should be placed and how the aerial is to be used.

Is there an immediate rescue? Generally, the first-due truck company should ladder the fire building. Some of the main objectives would be to provide forcible entry, search, and ventilation to make operations easier for the members inside. However, if civilians are at a window or on the fire escape and enough ground ladders are not available for removing them, the aerial may be needed for rescue.

If no immediate rescue is involved, the size of the frontage of the building may affect aerial placement. For taller buildings, the apparatus must be placed closer to the building to afford the ladder its maximum reach; the apparatus may be parked farther away from the shorter building to deploy its aerial. This tactic will give the first-due engine and other arriving companies good access to the front of the fire building.

The smoke, heat, and fire from the incident building could cause a dangerous exposure to the ladder and the members climbing the ladder. If the building is crew can safely climb the ladder to the roof of the fire building and proceed to the area to do their job. In older cities, many homes are attached and share a common height. If this is the case, the aerial may be positioned to the roof of one of the adjoining buildings; the crew can walk across the connected roofs to get to the roof of the fire building.

SOMETIMES, BEING CREATIVE HELPS!

No amount of words can stress enough the importance of proper positioning of the aerial truck and efficient use of the aerial ladder if needed. They will allow the crew to accomplish the truck's objectives and make engine operations much easier. In contrast, an improperly positioned truck can render the aerial ladder useless, block other incoming companies, and hamper fireground operations.

Here are some additional thoughts when things do not always go as planned. If overhead obstructions will interfere with aerial operations, the apparatus could be positioned on a vacant lot or in a driveway that adjoins the building. A good example would be a school fire. If the front of the school building cannot be laddered because of obstructions, the apparatus might be positioned in the schoolyard.

Sometimes, deploying the aerial ladder in an older congested city necessitates creativity. The ladder truck proceeds down the narrow street to the incident. The truck pulls up directly behind the engine. Overhead wires are strung across the street, which means the aerial must be rotated at a low angle of inclination. In addition, as the ladder is rotated toward the fire building, a tree on the sidewalk obstructs the ladder from rotating into a perpendicular position facing the fire building. In this case, the operator can simply rotate the aerial ladder away from the fire building, bring the ladder around over the cab, and then position it to be raised and extended.

In some situations, the truck may be the first apparatus on the scene. If there is room to deploy the aerial, the driver should immediately spot the apparatus and deploy the aerial. However, the driver should consider room for the incoming engine company. If there is no room to deploy the aerial, the driver should consider placing the apparatus away from the building. When placing the apparatus away from the building, the driver should consider leaving room for the incoming units and not block any hydrants. The driver should also consider the space that will be needed to remove ground ladders from the apparatus.

SAFETY TIPS BEFORE AERIAL DEPLOYMENT

Following are some simple but important tasks that should be done before putting the aerial to work safely.

- Always set the parking brakes. On the tillered aerial, two brakes must be applied—the parking brake and the trailer brake. In newer apparatus, the aerial will not operate unless both brakes are set.
- Always chock the wheels. One set of chocks should be on each side of the apparatus. For the tractor-trailer aerial, the chocks should be ahead of and behind the front steering axle. Restraining the front axle provides additional friction, preventing movement of the apparatus on the outrigger system. This is particularly important when operating on hilly terrain.

- In most situations, stabilizing plates should be placed under the outriggers, especially when on sidewalks. This will provide greater surface-to-ground contact to stabilize the apparatus. The handle of the plate should be up and in toward the apparatus, to prevent members or civilians from tripping over the plate as they walk by the rig.
- It is not recommended that outrigger pads be used on hills; they can increase the chance of the apparatus' sliding down the hill. Also, outrigger jacks should not be set over a manhole cover or storm drain.
- Clear the area around the aerial and the turntable of all tools, impediments, and personnel as the ladder is being raised and rotated.
- Follow the operating limits recommended by the manufacturers.

TIPS FOR RAISING THE AERIAL LADDER

Once the apparatus is properly placed and stabilized, the aerial is ready to be used. For deployment of the aerial ladder, the three major evolutions are raise, rotate, and extend. Under ideal conditions, these evolutions are done one at a time and in proper operating sequence. The operator should not try to raise, rotate, and extend simultaneously. This can lead to confusion and will not hasten the deployment of the aerial.

Obstructions may necessitate that the operator deviate and make adjustments on some of the evolutions; however, the theory on raising the aerial remains basically the same.

Two common miscalculations new or inexperienced aerial operators make are placing the ladder well above the target and extending the ladder well short of the target. These common errors will force the operator to make time-consuming adjustments to get the aerial properly positioned.

The following simple tips will help operators to place the aerial to its target with minimal movement.

For ideal aerial placement, the retracted aerial should be raised from the cradle to an angle at which the operator can rotate the ladder to a perpendicular position facing the building. At this position, the operator can adjust the angle of the aerial. These adjustments are to align the retracted ladder with the intended target. Once the alignment has been determined, the operator can extend the aerial to a close proximity over the target. With the ladder over the target, the operator can bring it toward the object in a smooth and controlled manner.



(5) Use the tip of the aerial as a front sight. Aim the aerial, and extend the ladder toward the target. This will help determine the angle of the ladder raise.

How is the proper angle of inclination established? I prefer to use the tip on the beam of the fly section on the side with the control console. Standing on the turntable at the control console, I would locate that tip and imagine that the side of the aerial is the barrel of a gun and the tip on the fly section the front sight. I would then aim the tip of the fly section at the objective (photo 5). Once the adjustments are made, the ladder will be at the proper angle for extension.

The angle of inclination must be properly determined for the next step to be successful. When operators extend the ladder well short of the intended target, the main problem is depth perception. Two methods can help the operator solve this perception problem. One method is for sunny daytime operations; the other is for incidents that occur at night and on cloudy overcast days.



The shadows of the aerial ladder are used to assist in extending the aerial ladder. This method works if the building is in direct sunlight. The operator picks up the shadow of the aerial as it moves along the wall of the building as the aerial is being extended toward the target. When the tips of the shadow and of the aerial meet, the ladder is flush against the building (photo 6).



(7) The position of the floodlights at the tip of the aerial can help the operator in extending the ladder toward the desired target.

If the aerial has floodlights at the tip, these lights can help the aerial operator to judge the proper distance for extending the ladder. These lights are very effective during night operations. When the aerial is resting in the cradle, the floodlights should be facing down. The lights should always be in the "ON" position (photo 7).

The floodlights will illuminate the front of the building when the aerial is raised, rotated, and in position to be extended. The operator should focus on the tip of the aerial as it is extended toward the roof, windowsill, balcony, or fire escape. Within the illuminated area, the light beam shining from the floodlight will create a dull circular pattern against the building. As the ladder is extended, this dull circular light pattern will move toward the object and become sharper. Once the pattern reflects on the edge of the object, the operator can assume that the tip of the aerial is flush with the target (photo 8). At this point, the operator may make minor adjustments to obtain the final and proper placement of the aerial.



(8) The aerial ladder is basically flush to the building when the floodlights shine on the windowsill. This photo was taken on an overcast day.

During overcast and cloudy days, the floodlights will not illuminate the building. However, as the aerial is being extended, the floodlights will still project a dimly lit circular pattern against the building. Once the operator picks up the lighted circle, he can take the same steps as for the night operation.



(9) The left top rail on the outside section of the aerial is aligned with the left trimmer of the window. When extended, the aerial will be perfectly placed between the window trimmers.

To deploy the aerial accurately between the trimmers of a window, when the aerial has been rotated into position and the angle of inclination has been determined, align the top section of the outside ladder rail with the trimmer of the window, and extend (photo 9).

Here are some factors the aerial operator must consider to ensure that the aerial is in proper position and safe for members to climb:

- Always be aware of overhead obstructions as the aerial is being deployed. Keep the aerial at least 10 feet away from overhead wires to allow for ladder sway, rock, or sag. If the aerial should contact a power line, personnel should remain on the apparatus until the power is shut off or the aerial is freed from contact.
- For roof operations, the aerial should be extended three to six feet over the edge of the roof. The extended ladder will provide greater visibility for the ventilation crew on the roof to locate the ladder should conditions begin to deteriorate. The extension will also allow members to maintain a firm handhold at a normal standing position while mounting or dismounting the ladder.

- The aerial should remain two to three inches out from the building, to avoid straining the edge of the roof. When climbing the ladder, members' weight will be applied to the aerial, and the beams will come to a rest on the roof's edge.
- The operator should always consider the stability of the structure against which the ladder is placed.
- For windows and fire escapes, the rung at the tip of the ladder should be placed flush to the windowsill or the top railing of the fire escape. The aerial should not be extended into the window or past the top railing of the fire escape. This tactic will compromise some of the opening and space the window or fire escape provides should members or civilians need a quick bailout.
- As mentioned, the apparatus should be positioned so that the rotated aerial ladder is perpendicular to the building. This gives the operator the opportunity to position the ladder as squarely as possible against the building. If the aerial is placed at an angle to the building, one beam of the ladder will contact the building first. As the climbing member's weight approaches the tip, the ladder will twist until the other beam also rests on the roof's edge. This twisting can weaken all sections of the ladder and increase the potential for ladder failure.

LADDER IN PLACE, NOW WHAT?

Once the aerial is in position, the operator must stay near the turntable. Under most situations, the aerial should never be moved. The operator should be aware of which members climbed the aerial ladder, when, and their present locations. If ordered to move the aerial, the operator must inform the incident commander that the aerial was used, and the crew must be notified by radio that the aerial is being moved. By standing on the turntable, the operator can be used to carry tools or equipment, when needed, to the upper floors or roof.

To ensure safety, take the following precautions:

- Except for removing firefighters from serious exposure or rescuing them in an extreme situation, the ladder should not be rotated while firefighters are on it.
- The ladder should never be extended or retracted while members are climbing it.
- When the aerial is extended to the roof, the rungs should always be aligned.
- Members should maintain a safe distance between each other when climbing an aerial.
- For extended operations, the driver may disengage the power takeoff to prevent the ladder from moving accidentally.

THE JOB IS DONE!

After the fire is out and the aerial is no longer needed, the IC will order the ladder to come down. The operator should pull the aerial away from the building in a smooth and controlled manner, avoiding unnecessary whipping. Retract, rotate, and lower are the evolutions for returning the aerial to the cradle. The operator must be aware of the same overhead obstructions as when raising the ladder. At the shift change, the outgoing operator should apprise the oncoming operator of what took place on the earlier shift.

At a structure fire the aerial ladder truck can be a very important piece of equipment. The key is to get that truck properly positioned and, if possible, the ladder deployed. The responsibilities of the truck company apparatus operator are many, and the challenges are great. Thus, the operator has a pulse on the outcome of the entire fireground operation. The suggestions on accurately placing the aerial ladder to the building are just insights of one aerial operator. Firefighters who spend time learning the capabilities of the aerial ladder and who put some thought into the job of aerial operator can make their truck company an asset on the fireground. Although the information presented here is based on using a tractor-trailer aerial and the dispatched assignment of a major urban fire department, the perspectives can be tailored to any fire department's truck company operations.

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